MLD685D

Feb. 2011

Features

- Low on-state resistance
- Built-in gate protection diode

Package

MT100 (TO3P)

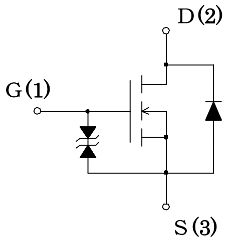
Applications

- Electric power steering
- High current switching

Key Specifications

- $V_{(BR)DSS}$=60V (I_D=100μA)
- $R_{DS(ON)}$=4.7mΩ Max. (V_{GS}=10V,I_D=42A)

Internal Equivalent Circuit



Absolute maximum ratings

Characteristic	Symbol	Rating	Unit
Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	±20	V
Continuous Drain Current	I_D	±85	A
Pulsed Drain Current	$I_{D(pulse)}$ ※1	±280	A
Maximum Power Dissipation	P_D	150 (Tc=25℃)	W
Single Pulse Avalanche Energy	E_{AS} ※2	280	mJ
Channel Temperature	Tch	-55~150	°C
Storage Temperature	Tstg	-55~150	°C

※1 PW≦100μ sec. duty cycle≦1%

※2 V_{DD}=20V, L=1mH, I_L=20A, unclamped, See Fig.1

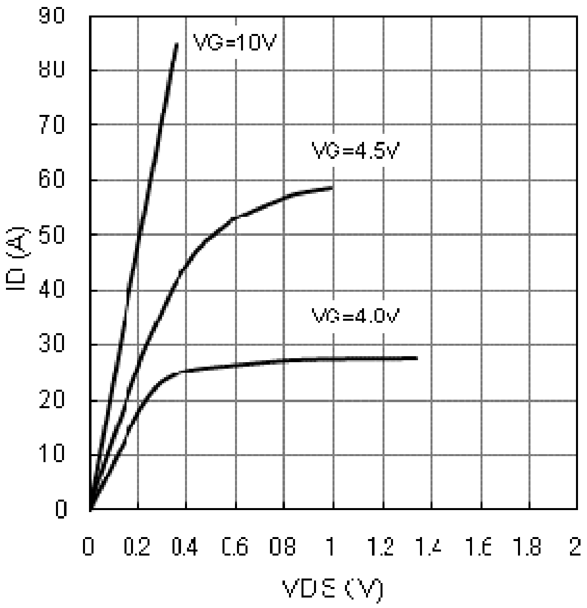
Electrical characteristics

(Ta=25°C)

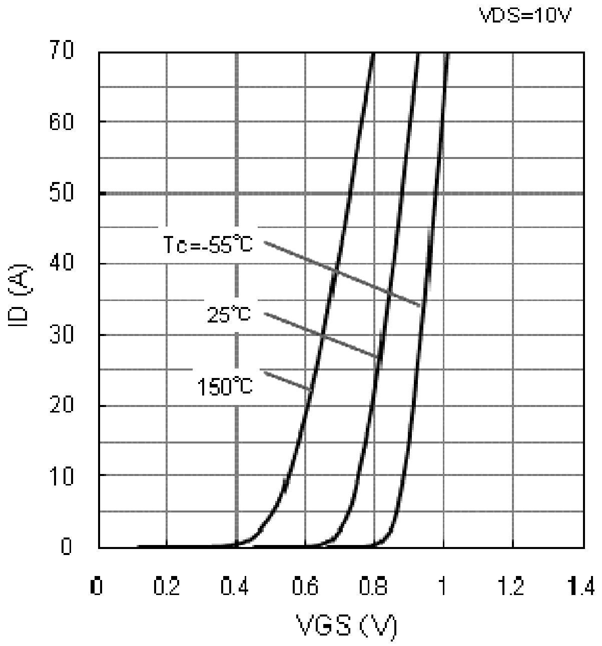
Characteristic	Symbol	Test Conditions	Limits			Unit
			MIN	TYP	MAX	
Drain to Source breakdown Voltage	$V_{(BR)DSS}$	I_D=100μA,V_{GS}=0V	60			V
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V			±10	μA
Drain to Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			100	μA
Gate Threshold Voltage	V_{TH}	V_{DS}=10V, I_D=1mA	2.0	2.5	3.0	V
Forward Transconductance	Re(yfs)	V_{DS}=10V, I_D=42A	30			S
Static Drain to Source On-Resistance	$R_{DS(ON)}$	I_D=42A, V_{GS}=10V		4.0	4.7	mΩ
Input Capacitance	Ciss	V_{DS}=10V V_{GS}=0V f=1MHz		11500		pF
Output Capacitance	Coss			1500		
Reverse Transfer Capacitance	Crss			1100		
Turn-On Delay Time	$t_{d(on)}$	I_D=42A, V_{DD}□16V R_G=22Ω, V_{GS}=10V See Fig.2		60		ns
Rise Time	t_r			25		
Turn-Off Delay Time	$t_{d(off)}$			370		
Fall Time	t_f			65		
Source-Drain Diode Forward Voltage	V_{SD}	I_{SD}=50A,V_{GS}=0V		0.87	1.5	V
Source-Drain Diode Reverse Recovery Time	trr	I_{SD}=50A di/dt=100A/us		70		ns

Characteristic Curves (Tc=25°C)

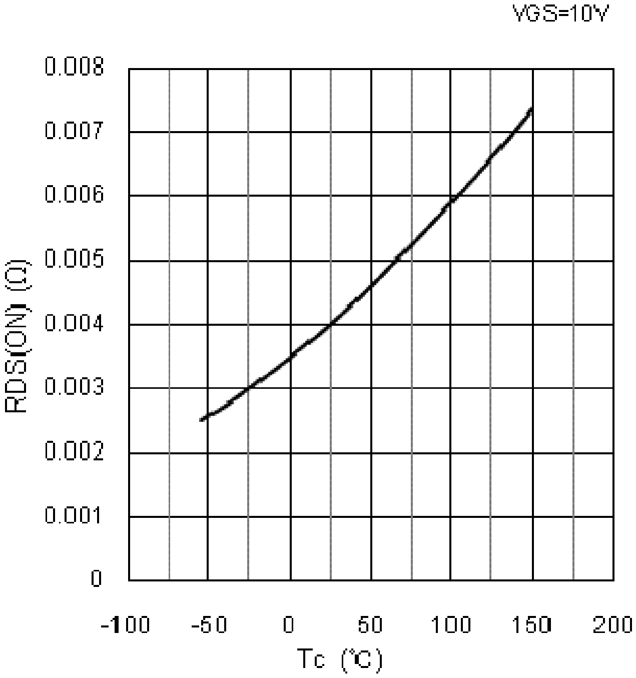
ID - VDS characteristics (typical)



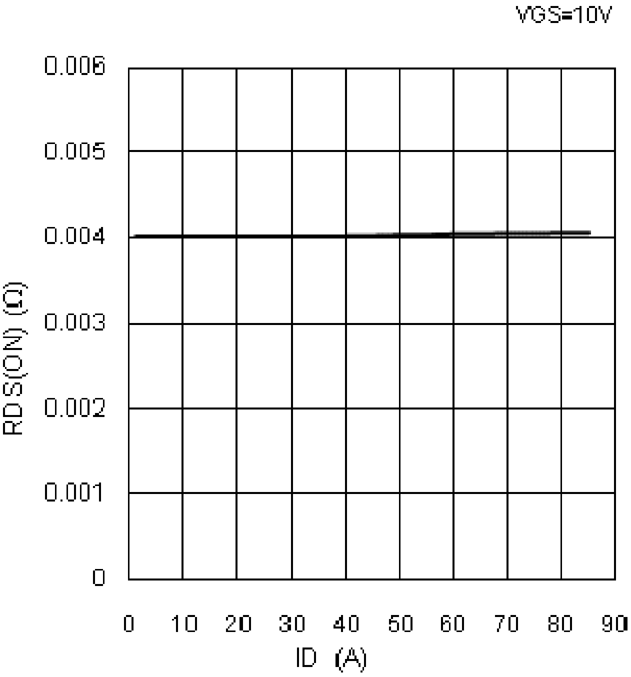
ID - VGS characteristics (typical)



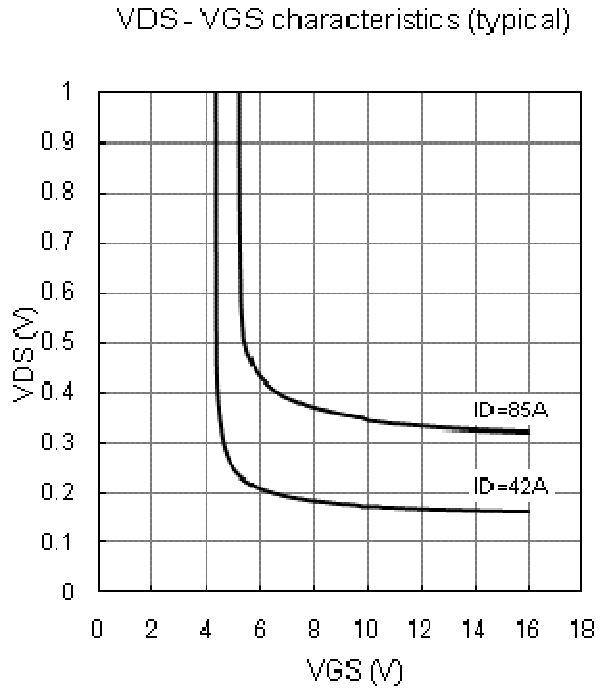
RDS(ON) - Tc characteristics (typical)

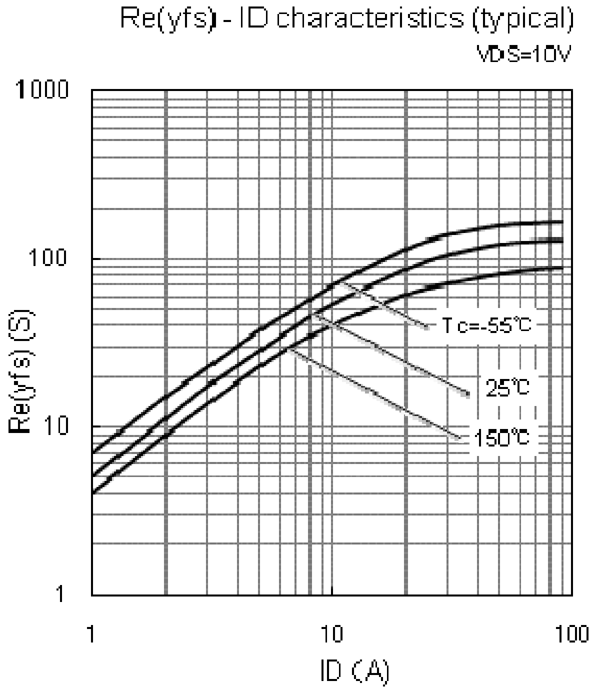


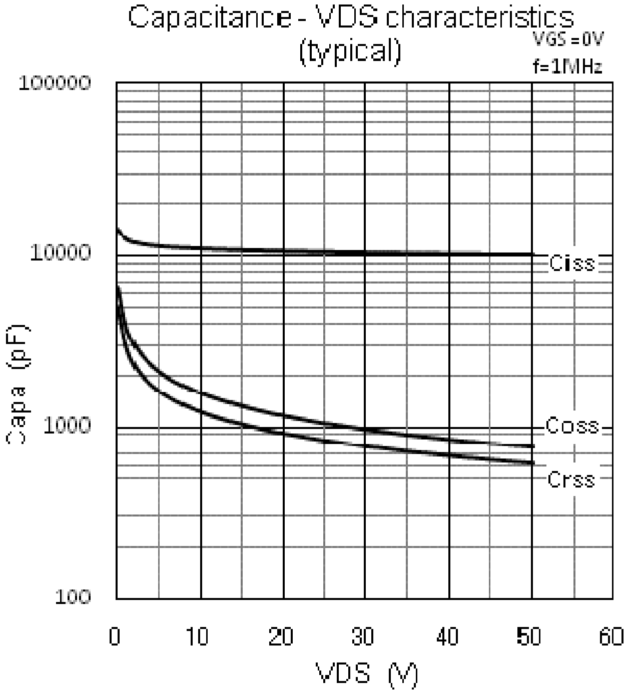
RDS(ON) - ID characteristics (typical)

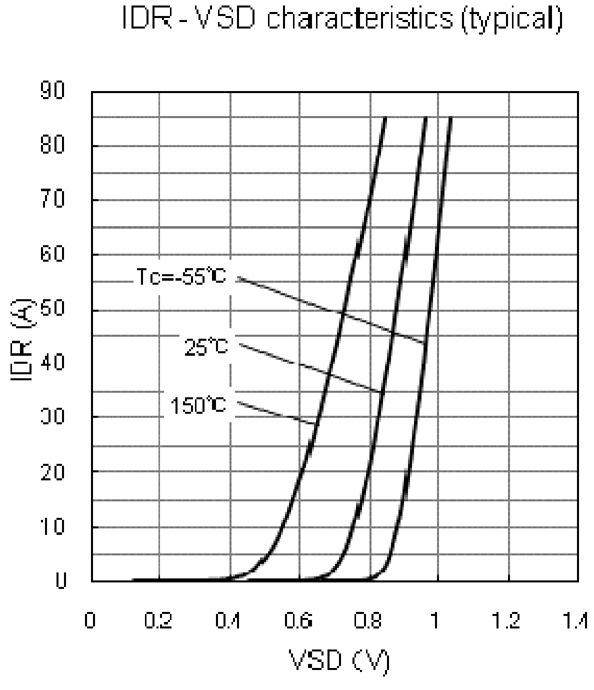


Characteristic Curves (Tc=25°C)

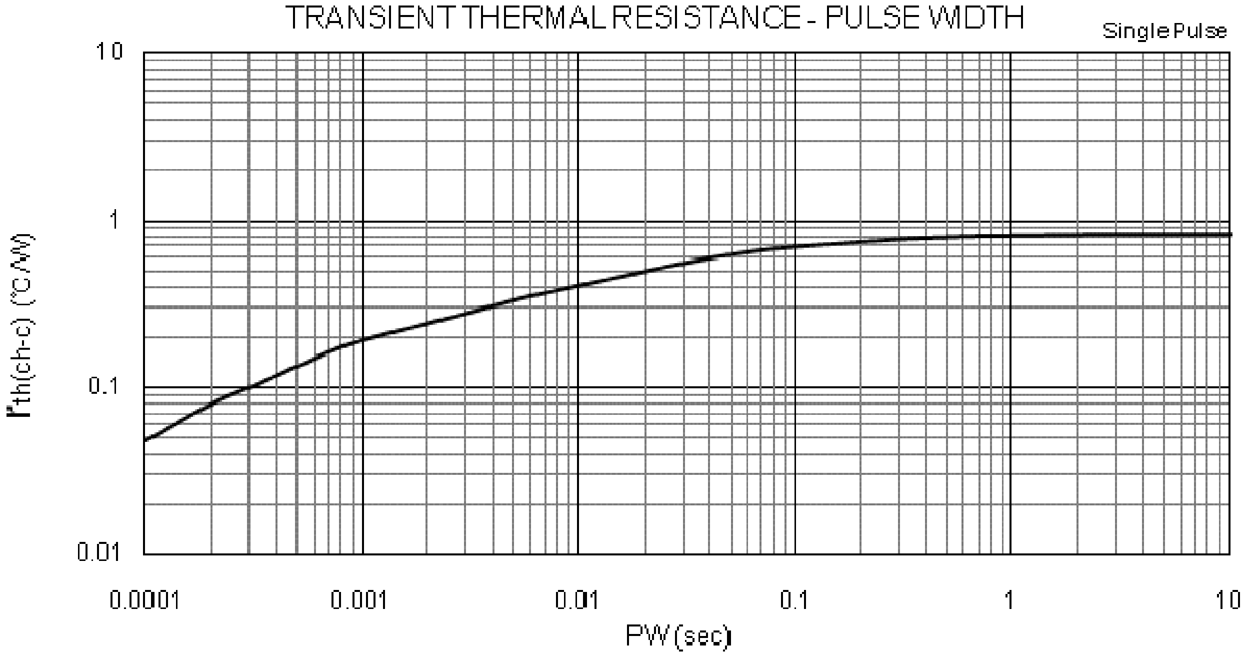

VDS - VGS characteristics (typical)

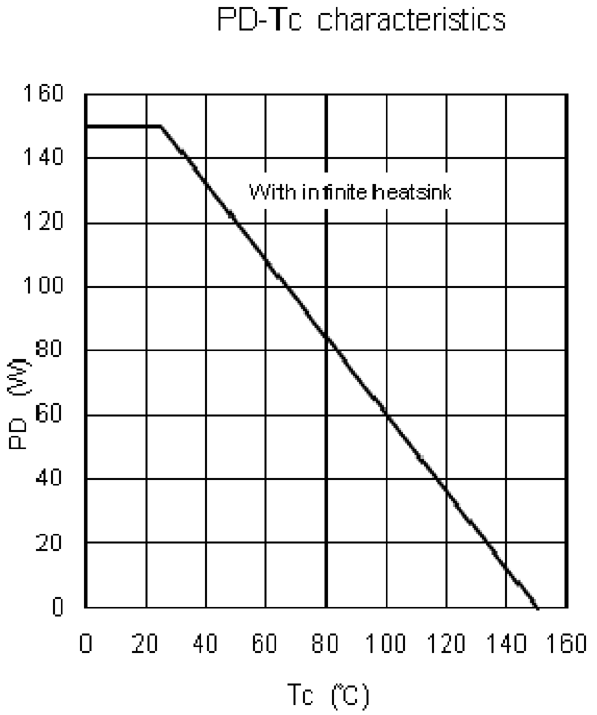

Re(yfs) - ID characteristics (typical)


Capacitance - VDS characteristics (typical)


IDR - VSD characteristics (typical)

Characteristic Curves (Tc=25°C)





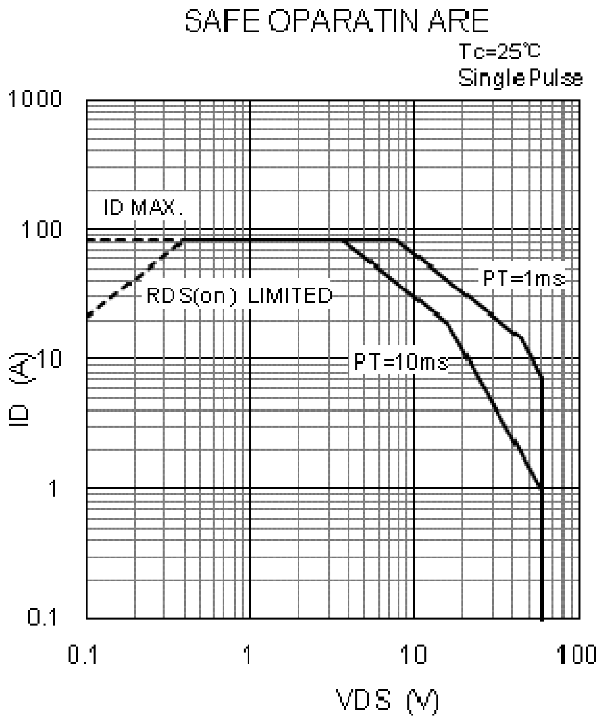
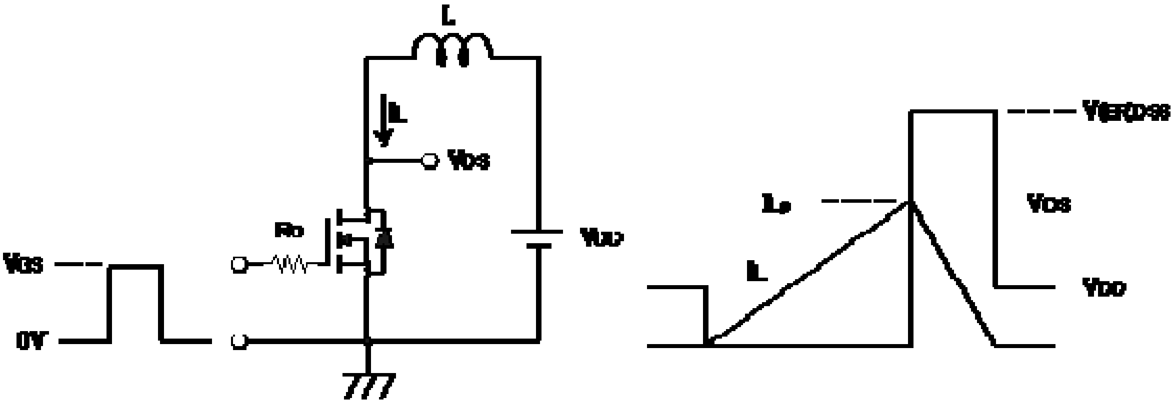


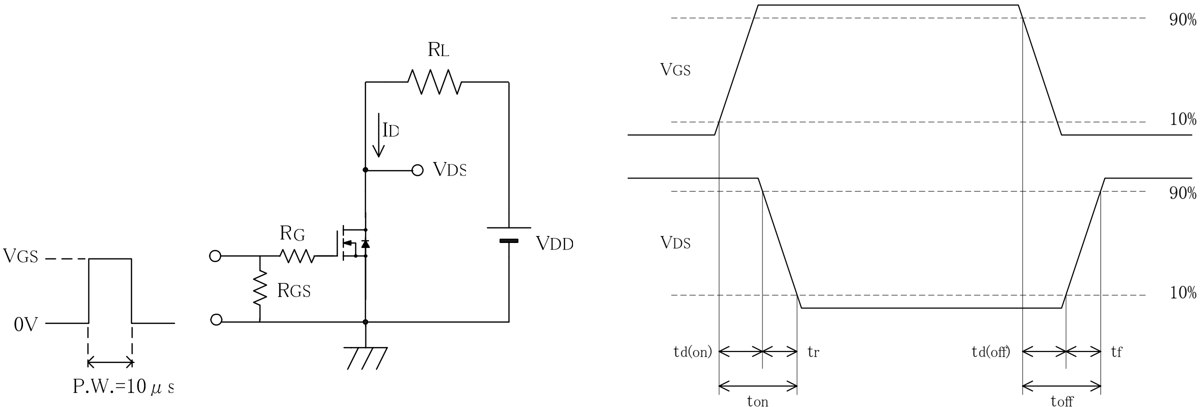
Fig.1 Unclamped Inductive Test Method

$$E_{AS}=\frac{1}{2}\cdot L\cdot I_{LP}^{2}\cdot\frac{V_{(BR)DSS}}{V_{(BR)DSS}-V_{DD}}$$



(a) Test Circuit (b) Waveforms

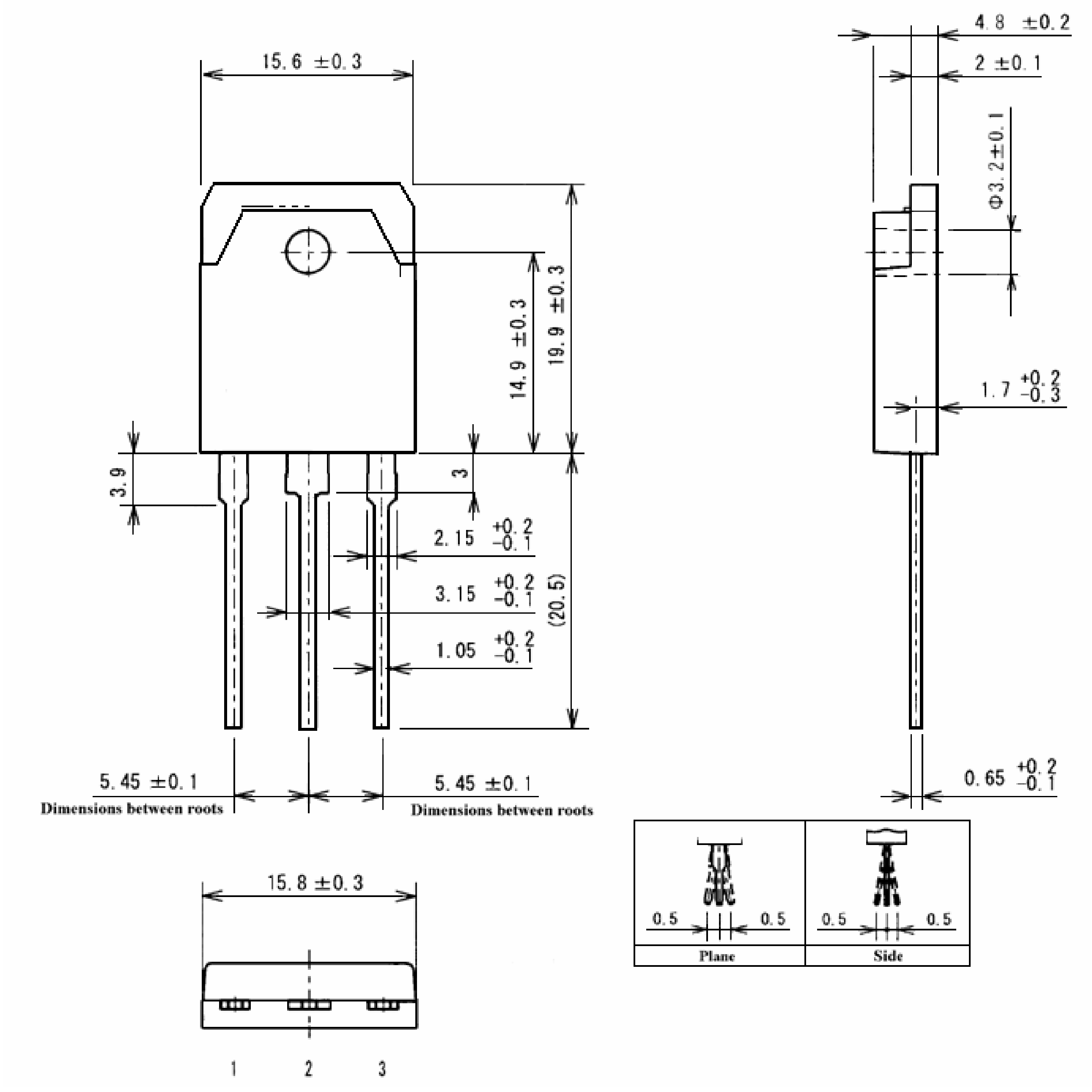
Fig.2 Switching Time Test Method



(a) Test Circuit (b) Waveforms

Outline

MT100 （TO3P）



(1) Gate
(2) Drain (Back Side)
(3) Source

Weight Approx. 6g